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Reionization and the Hubble Constant: Correlations in the Cosmic Microwave Background

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Recently, the James Webb Space Telescope (JWST) has found early galaxies producing photons from more efficient ionization than previously assumed. This may suggest a reionization process with a larger reionization optical depth, τ_{reio}, in some mild disagreement with that inferred from measurements of cosmic microwave background (CMB). Intriguingly, the CMB would prefer larger values of τ_{reio}, more consistent with the recent JWST hint, if the large-scale measurements (i.e. $\ell < 30$) of E-mode polarization are removed. In addition, τ_{reio} has an indirect correlation with today's Hubble constant H_0 in ΛCDM. Motivated by these interesting observations, we investigate and reveal the underlying mechanism for this correlation, using the CMB dataset without the low-ℓ polarization data as a proxy for a potential cosmology with a larger τ_{reio}. We further explore how this correlation may impact the Hubble tension between early and late universe measurements of H_0, in ΛCDM as well as two proposals to alleviate the Hubble tension: the dark radiation (DR) and early dark energy (EDE) models. We find that the Hubble tension gets further reduced mildly for almost all cases due to the larger τ_{reio} and its positive correlation with H_0, with either the Baryon Acoustic Oscillations (BAO) data before those from the Dark Energy
Spectroscopic Instrument (DESI) or the DESI data.

Mini Symposia (Invited Talks Only)

Plenary (Invited talks only)

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